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'Flawless' flight takes Cassini to Saturn orbit

Upon arrival for Saturn orbit, Cassini sent back this image showing the sunlit side of a portion of the planet's rings.



Bob Brown/JPL, Photolab

Tom Gavin, associate director, flight projects and mission success, high-fives Lab Director Dr. Charles Elachi.

The international Cassini-Huygens mission has successfully entered orbit

around Saturn. At 9:12 p.m. PDT on Wednesday, June 30, flight controllers received confirmation that Cassini had completed the engine burn needed to place the spacecraft into the correct orbit. This begins a four-year study of the giant planet, its majestic rings and its 31 known moons.

"This is a tribute to the team at NASA and our partners at the European Space Agency and the Italian Space Agency, to accomplish this feat taking place 934 million miles (1.5 billion kilometers) away from Earth," said Dr. Ed Weiler, associate administrator for space science at NASA Headquarters. "What Cassini-Huygens will reveal during its tour of Saturn and its many moons, including Titan, will astonish scientists and the public. Everyone is invited to come along for the ride and see all this as it is happening. It truly is a voyage of discovery."

Referring to the past six months, during which JPL also led efforts to successfully land two Mars Exploration Rovers and fly by comet Wild 2 with Stardust, Weiler quipped, "How do we get away with having so much fun?"

Members of the Cassini-Huygens mission team at JPL broke into cheers and high-fives as NASA's Deep Space Network

confirmed receipt of the signal indicating successful entry into orbit.

"We didn't expect anything less and couldn't have asked for anything more from the spacecraft and the team," said Robert Mitchell, program manager for the Cassini-Huygens mission at JPL. "This speaks volumes to the tremendous team that made it all happen."

Dr. Charles Elachi, JPL director and team leader on the radar instrument on board Cassini, said, "It feels awfully good to be in orbit around the lord of the rings. This is the result of 22 years of effort, of commitment, of ingenuity, and that's what exploration is all about."

Dr. Carolyn Porco, from the Space Science Institute in Boulder, Colo., and

Cassini's imaging team leader, expressed "surprise and shock" at "the beauty and clarity" of the initial images of the planet's rings.

The mission will face another dramatic challenge in December, when the spacecraft will release the piggy-backed Huygens probe—provided by the European Space Agency—which will plunge through the hazy atmosphere of Saturn's largest moon, Titan.

"This was NASA doing it right," said Dr. David Southwood, director of scientific programs for

the European Space Agency. "They really gave those of us in Europe a challenge. We've got six months to go until we land on Titan. We're just praying that everything will go as well.

"This is a world mission," he added. "But it's been America's evening, with JPL representing America. We've got a lot to live up to."

Julie Webster, Cassini-Huygens spacecraft team chief, said, "The spacecraft has been an incredible joy to fly. We stand on the shoulders of people who had 40 years of experience building and designing spacecraft."

Added spacecraft team chief Jeremy Jones, "Cassini performed absolutely flawlessly."

Saturn is the sixth planet from the Sun. It is the second largest planet in our solar system, after Jupiter. The planet and ring system serve as a miniature model of the disc of gas and dust surrounding our early Sun that eventually formed the planets. Detailed knowledge of the dynamics of interactions among Saturn's elaborate rings and numerous moons will provide valuable data for understanding how each of the solar system's planets evolved.

Cassini traveled nearly 3.5 billion kilometers (2.2 billion miles) to reach Saturn after its launch on Oct. 15, 1997. During Cassini's four-year mission, it will execute 52 close encounters with seven of Saturn's 31 known moons.

JPL's ST6 software makes its own discovery

Image shows the output from the Autonomous Sciencecraft Experiment volcanic thermal detector, obtained May 7.

Software on a NASA spacecraft recently made a scientific observation on its own without human interaction. The Space Technology 6 Autonomous Sciencecraft Experiment captured images of Antarctica's Mount Erebus and detected volcanic activity.

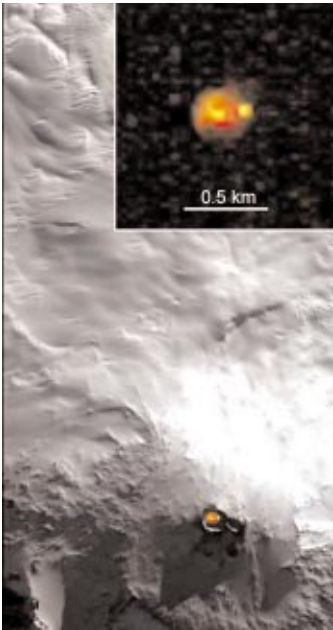
The software, developed by JPL, controls the Earth Observing-1 spacecraft. NASA's Goddard Space Flight Center manages the satellite. The software examines pictures from the Hyperion spectrometer, an instrument highly sensitive to heat released from molten lava.

After taking an image of Erebus, the software detected heat from the lava lake at the summit of the volcano and reprogrammed the camera to take more pictures. News of the detection was rapidly transmitted to scientists, where, typically, it could take months to learn a remote volcano was active. Scientists normally would need to take measurements at the volcano to detect the same type of event. Researchers at JPL and Goddard will test the Autonomous Sciencecraft Experiment on Erebus and other volcanoes for the next several months.

"Autonomous Sciencecraft is a giant leap toward a thinking spacecraft," said Dr. Steve Chien, JPL senior technologist for the software. "The software is the first use of autonomy allowing the spacecraft to make decisions without waiting for commands from scientists. It can capture short-lived science events that otherwise would have been missed."

"With this software we can monitor many more volcanoes, since it

knows how to only look at the active sites," said Dr. Ashley Davies, JPL lead scientist for the experiment. "This software can be used to track natural disasters that pose danger to populated areas, such as flooding and fires," said Rob Sherwood, JPL experiment manager.



Future versions of the software also may be used to track dust storms on Mars, search for ice volcanoes on Europa, and track activity on Jupiter's volcanically active moon Io.

NASA's New Millennium Program developed both the satellite and the software. The program is responsible for testing new technologies in space.

For more information, visit <http://ase.jpl.nasa.gov>.

UK official pays a visit



The Laboratory last month hosted Lord David Sainsbury, Great Britain's Parliamentary Under-Secretary of State for Science and Innovation. Here, Cassini Program Manager Bob Mitchell shows Sainsbury a Cassini model as British Consul General Peter Hunt and JPL Director Dr. Charles Elachi look on. Sainsbury's visit also included an overview of the Mars Exploration Program.

150 new online courses offered

By Mark Whalen

Professional Development has announced the debut this month of new online training courses for JPL employees. About 150 courses will be offered as an enhancement to the Lab's current series of instructor-led classroom sessions.

A three-month pilot program offering management and leadership courses will be available to JPL staff through vendor Targeted Learning Corp. (TLC), a leader in online education, said Professional Development Section Manager John Blowers.

One of the features of the program is its easy accessibility. Users can access the courses 24 hours a day, seven days a week, even from off-Lab. "Many people want to learn on their own time, as opposed to a scheduled training session," said JPL career counselor Mary Ellen Derro. "The Lab employs very busy people. Using TLC will allow them to get training on demand when they need it."

The new courses cover a wide breadth of topics that address critical competencies for JPL, Derro said. General categories in the course catalog include Change and Innovation, Communications, Customer Service, Group Development, Individual Development, and Management and Leadership.

Courses range from 30 to 120 minutes. All are multimedia-based, so that users can stop, pause or rewind as needed. Course materials can be downloaded and printed. A customer service office is also available.

TLC offers a new course menu each month, but once a course is presented it remains in an archive, where employees can access it at any time.

This year, Professional Development offers about 120 classroom sessions, the majority of which are science- or engineering-based. "TLC offers a whole lot more on leadership than we have now," Blowers noted.

Special Events Calendar

Ongoing Support Groups

Alcoholics Anonymous—Meetings are available. Call the Employee Assistance Program at ext. 4-3680 for time and location.

Caregivers Support Group—Meets the first Thursday of the month at noon in Building 167-111 (the Wellness Place). For more information, call the Employee Assistance Program at ext. 4-3680.

Codependents Anonymous—Meeting at noon every Wednesday. Call Occupational Health Services at ext. 4-3319.

Gay, Lesbian and Bisexual Group—Meets the first Friday and third Thursday of the month at noon in Building 111-117. Call the Employee Assistance Program at ext. 4-3680 or Randy Herrera at ext. 3-0664.

Parents Group for Children With Special Needs—Meets the second Thursday of the month at noon in Building 167-111 (the Wellness Place).

Working Parents Support Group—Meets the third Thursday of the month at noon in Building 167-111. For more information, call the Employee Assistance Program at ext. 4-3680.

Wednesday, July 7

Office of Exploration Systems Update—At noon in von Kármán Auditorium, progress and plans of JPL's engagement with the Office of Exploration Systems will be discussed. A question-and-answer session will follow.

JPL Library Orientation—Come to Building 111-104 from 11:30 a.m. to noon for an overview of the Library's products and services, and learn how to access numerous electronic resources from your desktop. For more information, call the Library reference desk, ext. 4-4200.

Software Architectures Course—Classes offered by the Software Quality Improvement Project and the Center for Space Mission Information and Software Systems begin their 10-week session. Dr. Edward Colbert of USC's Center for Software Engineering will instruct students in the concepts, principles and state-of-the-art methods in software architectures. Classes will be conducted for three hours each Friday afternoon for 10 consecutive weeks, ending Sept. 17. For more information, see <http://www.abssw.com/courses/JPL2004/index.htm> or call Brian Vickers at ext. 3-0877.

Friday, July 9

Investment Advice—Fidelity will offer one-on-one counseling in Building 249-114. To schedule an appointment, call (800) 642-7131.

Mon.–Tues., July 12-13

Investment Advice—TIAA/CREF will offer one-on-one counseling in Building 249-114. To schedule an appointment, call (877) 209-3140, ext. 2614 or log on to www.tiaa-cref.org.

Wednesday, July 14

JPL Library Orientation—Come to Building 111-104 from 11:30 a.m. to noon for an overview of the Library's products and services, and learn how to access numerous electronic resources from your desktop. For more information, call the Library reference desk, ext. 4-4200.

Thursday, July 15

Clogging Class—Meeting at noon in Building 300-217. For more information, call Shary DeVore at ext. 4-1024.

Thu.–Fri., July 15-16

Von Kármán Lecture Series—Cassini Deputy Project Scientist Dr. Linda Spilker will present "The Rings of Saturn" at 7 p.m. Thursday in von Kármán Auditorium and Friday in Pasadena City College's Vosloh Forum, 1570 E. Colorado Blvd. Thursday's lecture will be webcast at <http://www.jpl.nasa.gov/events/lectures/jun04.cfm>. For more information, call Public Services at ext. 4-0112.

Friday, July 16

"Root Cause Trends for Serious On-Orbit Anomalies"—Julia White, senior engineering specialist for the Aerospace Corporation's Cross Program Research Office, will speak at 10:30 a.m. in Building 180-101. Her work addresses industry-wide issues in the fields of on-orbit spacecraft anomalies and lifetimes, lessons learned and satellite development comparisons, as well as program-specific concerns requiring a cross-program perspective.

Monday, July 19

"How to Finance Your Child's College Education"—David Levy, director of financial aid at Caltech, will speak at noon in von Kármán Auditorium. He will address the availability of student financial aid, what types are available, how much financial aid you might expect, who qualifies and how to navigate the often complex financial aid application maze. This talk will be geared to families with junior-high to high-school age children.

Wednesday, July 21

TIAA/CREF Enrollment Meeting—This workshop, to be held at noon in Building 180-101, is designed to assist employees newly eligible for the TIAA/CREF retirement plan with selection of investment options and the completion of their enrollment forms.

Another advantage of the new courses is that they offer Lab personnel "a chance to get a fresh perspective on career development and leadership," Blowers said. "Most of what we offer in the classroom is JPL-specific. Using TLC is a way to get outside JPL, to see what other organizations do."

Offering the new courses makes good business sense for JPL, Blowers said. "It would have cost us hundreds of thousands of dollars to develop and design the courses TLC is offering. We will pay about \$3,000 a month for the 150 TLC courses."

Lab staff will not be charged for TLC courses, Derro said. "Professional Development is absorbing the cost so we can assure our employees can take advantage of this." Employees will receive training credit once the course evaluation has been completed.

"If we have a positive response," Blowers added, "we will consider more 'E-learning' that's convenient for employees."

To obtain login instructions for TLC courses, visit the Education and Training website at <http://et> or the Human Resources site at <http://hr>. Derro said users must have Windows Media 8.0 or newer to access the program. Employees can contact the Professional Development customer service line at ext. 4-3750 for assistance.

Meanwhile, Professional Development continues to offer various avenues to career advancement. Tuition reimbursement is available for JPL's formal degree and certificate programs, for up to \$3,000 a year. Undergraduate programs offer up to \$5,250 a year. Graduate-level degrees, if job-related and approved by management, can be reimbursed as much as \$10,000 a year. For more information, call the Tuition Reimbursement Office at ext. 3-6611.

"From all levels of the organization, we're hearing what our customers want and we are trying to meet their needs," Derro said.

How long have you been at JPL, and what other projects have you worked on?

I've worked at JPL for nearly 39 years. My most recent project before Cassini was Galileo, where I started in 1979 as mission design lead. The original launch date was January 1982, but we had numerous launch slips, and we did a lot of mission redesign work.

In the fall of 1988, after Galileo's trajectory and mission design work was all done and it was on track to launch in October 1989, I took the job of manager of the Mission Design Section 312. I fully expected that was the end of my contributions to Galileo. But then in September 1992, Galileo science and mission design manager Jim Dunne died, and I went back to Galileo to fill that role. When Neal Ausman retired, I was named Galileo mission director, and then became Galileo project manager in January 1998, and stayed there until taking the Cassini job in June 1998.

What are the mission's most significant science goals? Is there one major priority?

You would get different answers to that from the different scientists, depending on what their individual investigations are. But as a non-scientist, I think the main single priority is Titan—not just because we have the Huygens probe, but because we will do investigations of Titan using the orbiter as well. Titan is the only moon in the solar system that has an atmosphere. Scientists tell us it's probably like Earth was 3 billion to 4 billion years ago. It's like Earth was put in a deep freeze and is sitting there, waiting for life to come along and form. Of course, we have no expectation of finding any life there. Huygens is going to give us in-depth, close-up observations of Titan.

The rings are also high on the priority list—they are what Saturn is most known for. They have a number of mysteries, particularly related to dynamics and longevity. We don't know how long they've been there or how long they'll be there. Most theories have them appearing relatively recently—millions of years ago. On a geologic time scale, many millions is relatively short. How were the gaps created? One of the rings appears to be braided. There are a number of phenomena in the dynamics of the rings that aren't readily explained just by gravitational effects.

Another high priority is the small icy satellites—they have such variability. We flew by Phoebe June 11—the images are spectacular. Phoebe is one of the smaller moons—220 kilometers in diameter. Among the others, two are about 1,000 kilometers in diameter and another two are about 1,500 kilometers in diameter. They have very different features.

Iapetus has one side that is glistening white, while the other side is black as tar. There is a sharp, crisp boundary between the two sides, and scientists don't know why it looks that way. Enceladus is another mystery just waiting to share its secrets with us.

How many of Saturn's 31 moons will be studied?

For the four-year prime mission, the main focus is on Titan, for which we will have 45 close encounters. In addition to this, we will fly by five of the small icy moons for a total of seven encounters with these, eight counting Phoebe. We will fly by Enceladus three times and the others will be one each. These will be relatively close—within about 1,000 kilometers—where we will control the trajectory flyby point. Then there are about 50 or so more distant, non-targeted encounters with the small moons. These generally will be closer than the Voyager encounters to these bodies in 1980 and 1981.

Not nearly all of the moons are flyby candidates; some of them are farther out from Saturn than Cassini will ever travel. That was the case with Phoebe. We specifically set up the trajectory to fly by Phoebe on approach because once we go past it, Cassini's trajectory will never again carry it that far from Saturn. The same thing is true for some of the other satellites as well.

Another thing that constrains us is there is a lot of interest in getting the spacecraft in highly inclined orbits. Some scientists are very interested in this

because they can see what Saturn's magnetosphere is like near the pole. The imaging team likes the high-inclination orbits because Cassini can look down on the plane of the rings. But in these highly inclined orbits it becomes more difficult to have encounters with the satellites, because the satellites tend to be in the plane of the rings.

But even without getting close enough for targeted encounters, we will still get some good images of some of the other moons as well.

How many people will be working on Cassini?

We will have more than 200 engineers supporting the mission, the equivalent of about 200 full-time people. And there are about 250 scientists, about equally split between the U.S. and Europe. Most of them are not full-time on Cassini, but are university professors or associated with a research institution.

Here at JPL there are 20 to 25 scientists working on Cassini. Two of the investigations have the team leader here—Dr. Charles Elachi leads the radar team, while Dr. Arvydas Kliore leads the radio science team. They are team leaders since the instruments used for their investigations are facility instruments. Between JPL and the Italian Space Agency, we built four of these—radar, radio science, the camera and the visible and infrared mapping spectrometer.

Cassini also has eight instruments where principal investigators lead investigations. There are no PIs at JPL. There are some radar team members here, and some who work in radio science. Other teams, like the ultraviolet imaging spectrograph, have a few co-investigators from JPL. The Huygens probe instruments have two co-investigators here.

Is it fair to say that Cassini is the best-ever example of international cooperation on a NASA spacecraft? How many countries are involved? Has it been difficult to this point or smooth sailing?

Cassini-Huygens would have to be considered an excellent example of international cooperation, if not the best ever. The relationships with our international partners have been pleasant, collegial and professional. That's not to say that we don't have animated debates and disagreements at times, but they're always constructive, positive and short-lived. We have a total of 17 countries involved in this effort, and it has gone just remarkably well. I can't imagine having a better group of people to work with. Smooth sailing describes it quite nicely.

How are you and the team feeling? Excited? Nervous? Confident?

Yes, to all of those. The team is very upbeat; the Phoebe flyby got them really stoked. But the Phoebe flyby was not like falling off a log. It was our first use of optical navigation for two things: to target the spacecraft to a body this close, and in support of pointing the instruments to a target. It was also the first time we've done a "live update"—we had a sequence already on board, counting down to do the Phoebe observations, and in flight we changed parameters in the sequence memory that altered the pointing based on our updated knowledge of where both the spacecraft and Phoebe were.

There was some apprehension, but we had a fair amount of testing and training to validate that we could really do it, and it went off just flawlessly. The team deserves a lot of credit for an excellent job.

We're both confident and nervous at the same time; confident because we have no reason to think the orbit insertion won't work, nervous because if it doesn't, well, that's a bad day. If you were to ask me what we could work on further, I'd have to say there really isn't anything; we think we've beaten down all the tall risks.

To begin to see some return from all this investment of effort will be a big plus for the troops. I can see the excitement in the hallways already.

By Mark Whalen

Long ride ends, New one begins

CASSINI REACHES SATURN



After a journey of almost seven years and 3.5 billion kilometers (2.2 billion miles), the Cassini-Huygens spacecraft is about to begin its four-year study of Saturn and its moons. About a week prior to orbit insertion on June 30, Universe caught up with Program Manager Bob Mitchell.



Bob Brown/JPL Photolab



View this and previous issues of Universe at

<http://universe.jpl.nasa.gov>

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Notice to Advertisers

Advertising is available for JPL and Caltech employees, contractors and retirees and their families. No more than two ads of up to 60 words each will be published for each advertiser. Items may be combined within one submission. Ads must be submitted via e-mail to universe@jpl.nasa.gov and are due at 2 p.m. on the Monday after publication for the following issue.

All housing and vehicle advertisements require that the qualifying person(s) placing the ad be listed as an owner on the ownership documents.

Passings

THELMA CHAPMAN, 88, a retired computer programmer from Section 362, died April 28.

Chapman worked at the Lab from 1961 to 1983. She is survived by her sister, Donna Wark, and several nieces and nephews. Services were private.

JEANETTE MILLS, 39, a former buyer and subcontract negotiator in Section 621, died June 1 in Mexico City.

Mills joined the Lab in 1989. Her duties included work on the Growth and Assignment of People Team, part of the Total Quality Management initiative in the mid-1990s. Following that assignment, she contributed to New Business Systems' Human Resources Team. She left JPL in 1998.

Mills is survived by her mother, Jean, and sisters Andrea and Regina. Services were held June 11 at Mountain View Cemetery in Altadena.

Letters

On behalf of my family and myself, a very sincere thank you to all of my co-workers and friends who extended their love and support in the passing of my beloved father. My father was an avid admirer of JPL so your thoughtfulness and expressions of condolence, the sympathy cards and the beautiful plants that we received have an even more special meaning to our family.

Lesley Ibaven

I would like to thank my friends and co-workers for their expressions of sympathy and support on the death of my grandmother. Your words of comfort, cards and prayers made the loss more bearable. I would also like to thank the Employee Services & Recognition Office for the lovely plant they sent to my home.

Lloyd Keith

My family and I are deeply appreciative of the many cards, e-mails, gorgeous flowers and other expressions of sympathy extended by my JPL friends in the loss of my father. A special thank you to my friends and co-workers in Section 336 in particular for their caring and support during this very difficult time. Thank you also to JPL and the Employee Services & Recognition Office for the lovely plant. It serves as a reminder of the comfort that friends and co-workers bring at a time of grieving.

Joyce Donato

Classifieds

For Sale

AIR CONDITIONER, Whirlpool, room, 5900 BTU, model #ACM062, new \$200, sell for \$75/obo. 714/280-7368.

BARBECUE, Kenmore, propane grill with pushbutton ignition, side burner, wheels, tank, cover, used very little, \$150/obo. 626/254-1550.

BOOK, "The Big Band Almanac," 400 pages, describes 1920s-60s dance bands/leaders/ vocalists/musicians (Glenn Miller, Xavier Cugat, et al.), profusely illustrated & indexed, out-of-print edition, \$10. 626/793-1895.

CARPET, plush, light mauve, for 2 rooms, approx. 15' x 16' and 11' x 12', \$150. 626/794-1432.

CLOTHES, infant: jacket, red/navy blue, zip-up w/hood (Old Navy), size 2T, exc. cond., \$5/obo; sweater, sky blue w/navy trim, buttons, size 3T, \$1/obo; zipper shoes, Spongebob motif, size 11M, exc. cond., \$6/obo; photos avail. 626/791-6101.

COMPUTER DESK, on wheels, cherry veneer, made by O'Sullivan, model 61925, exc. cond., like new; sell for best offer. 626/449-0997.

CONCERT TICKETS, Pasadena Pops "Hot Latin Nights," Sat., Aug. 21 at Descanso Gardens, 7:30 pm, conductor Rachael Worby, great seats: sec. A, table F9, under tree, take picnic and visit with fellow concert lovers, see pasadenapops.com, \$65/ea. 626/ 664-6640, cell, or 626/795-4928 x214, Jerry.

COUCH, oversized, unique, designer; attractive curves, 2 pillows w/matching fabric, deep violet color w/olive green print, same as one used on MTV's "Real World Santa Monica," must see, \$450/obo, orig. \$2,000. 281-5118, James.

DINETTE SET, glass-top, 4 chair, \$80; SECTIONAL SOFA SET, beige, \$400. 626/355-7086.

DVDs/CD, all brand new and factory-sealed: Babylon 5, season 5, 6 DVD set, \$50; Matrix Revolutions DVD, \$13; Bacon Brothers Live

DVD, \$10; Josh Groban CD, \$10. 832-4681.

EXERCISE MACHINES: Proform 485e, low impact, elliptical, exc. cond., still under warranty, \$150; Fitness Flyer, low impact, with arm attachment, vg cond., \$100. 213/364-0552.

FURNITURE: 2-piece Bassett sectional (1 piece is a sleeper), floral print, photo & dimensions available, cushions need new covers, rest in gd. cond., \$300/obo. 626/791-6101.

LAWN MOWER, Black & Decker electric, model MM850, 19", 4hp, rear bag, 7 height positions, blades just sharpened, \$209 new at Home Depot, super lightweight, no fumes to breathe, hassle-free starting, needs no gas or oil, gd. cond., with manual, \$110. 332-0481.

MISC: baby crib, wood, white, w/mattress, \$60/obo; dryer, General Electric, electric, heavy duty, extra-lg. capacity, 5 cycle, gd. cond., \$120; coffee table, 40", glass, photos avail., \$40. 626/844-6478.

MISC: 8' pool table, \$500; tablecloths (2), slate blue oval, 18 matching napkins and rings, \$10; punch bowl set, 18 piece, \$10; mailbox, oversized, green, \$20; wig, red, shoulder length, never used, \$20; foodsaver with bags, \$20; electric frying pan, \$10; answering machine, \$5; fishing pole (saltwater), \$25. 626/357-8210.

MISC: desk, child-sized, oak, roll-top, \$50; plate display, maple, \$25; end table, maple, \$15; wood headboard, beautiful, \$25; antique water wheel pump, \$50. 626/582-8562, Karen (in Sunland).

MISC: calculator & manual, HP 48X, \$30; computer cases, for laptop, 3, new, \$10 each; sound blaster card, unopened, \$15; scanner, basic HP, USB, software, \$20; Jaz drive, 2 GB, SCSI +7 disks, \$50; Zip drive, 100 kb, plus 12 disks, \$35; light meter, Gossen Luna-Pro, \$50. 626/825-6480.

MOVING SALE: bedroom set, beautiful; dressers; antique and classic chairs; china hutch and credenza; dining room set; antique stove; executive desk; computer desk; Mac G3 computer. 760/439-7821, Darlene or dfhaug@yahoo.com.

MOVING SALE: work tables, 2, 21" D x 29" H x 7" L, sturdy, good-looking, \$35 ea.; dining rm. table, 32" x 50", teak, \$60; garment bag, Samsonite, \$20; photo vest, lg., Tamrac, \$35; light table, \$35; darkroom printing easels, wood, set 4, \$35; matboard holder, custom-made, \$25; hand matcutter, Logan, \$13; Slik U212 w/point-shoot trigger head + 2 quick release posts, \$60. 626/355-4967.

PAGEANT OF THE MASTERS TICKETS, 2, Aug. 7, 8:30 pm in Laguna Beach, director's tier center, row DD, face value, \$40 ea. 626/793-1520.

PHOTOGRAPHIC EQUIP.: body, Nikon 8008, AF, \$200; Nikon 6006, \$150; lens, Nikon, 35-135, AF, \$120; lens, 24-50, \$150; lens, 75-300, \$100; 60 mm, \$250; 2x extender, Kenko/Nikon, AF, \$50; flash, SB-24, \$140; sync cord, SC-17, \$35; lens hood, HB-24, \$10; lens hood, HB-1, \$10; viewer, right angle, DR-3, \$30; skylight, Hoya, 62mm, \$10; polarizer filter, color, Hoya 62 mm, \$20. 626/355-4967.

PIANO by Hobart M., cable, small, upright, exc. cond., buyer arranges pick-up in Simi Valley, \$750/obo. 805/660-7446, Ben Bronwein.

PUPPIES, golden retriever, adorable, purebred, born 4/22/04, wonderful temperament, all shots, 2 females (\$450) & 2 males (\$400), parents on premises. 831-4990, Sonia/Robert.

SCULPTURES of wizards, 3, ceramic, exc. cond., not antiques but are unique, only 200 of each in the world, each is different, holds a small clear ball in his hand, has a beard, and is about 10" H; for Lord Of The Rings fans, \$150 ea. 352-4033, after 5.

SURFBOARD, 6'7", great cond., \$300/obo. 626/232-1022.

TABLE, dining/library/work bench, mission oak, dbl. pedestal, 10" drop leaves, 70" x 40" overall, \$50/obo; HUB, wagon wheel, 8" x 12," solid oak, sits on 1" base for elec. light seen through slats, \$25. 909/593-4046, vividavies@earthlink.net.

TENTS, Sears Hillary, 9 x 9 ft., fiberglass poles, vg. cond., 2/\$80. 626/797-6982.

THEATER TICKETS, 2, Little Shop of Horrors, Ahmanson Theatre, Aug. 26, 8 p.m., in mezzanine, orig. \$140 + fees for pair, sell \$100. 790-8523.

TOOLS: box wrench set, complete, 6 wrenches, 3/8 to 1.0, \$15; 5 open-end wrenches, small, \$5; drill bit set (13), new, \$8; tin snips, \$7; many other small tools. 626/793-1895.

TRASH CAN for inside kitchen cabinets, brand new; metal guide rail, white plastic wastebasket and screws in original box for installation, about 1 x 2 x 3' tall, \$100/obo. 626/840-0955, leave message.

TREES, Bishop pine, 2, large, healthy and beautiful, 15' and 8', \$60 and \$40, or both for \$90. 249-4361.

WALKING JOINTER for grooving joints in newly poured concrete slabs & walkways, 1/2" radius, includes 10' telescopic extension handle, new, \$55. 249-6071.

WATERBED floatation syst., with foundation, Somma-type tubes, queen size, \$75. 626/447-6423.

YARD SALE: books, bookcases, dresser, clothing and great misc. stuff, Sat., July 10, 9:00-2:00, no early birds please, 2070 Maiden Lane, Altadena, near New York Drive & Lake Ave. 323/428-4289 or 323/227-8221.

Vehicles / Accessories

'98 ACURA Integra, 2 dr., gd. cond., 5 spd., black, 73K mi., 100K mi. warranty, am/fm/CD, \$9,700/obo. 626/705-1312 or sorozco@cefcu.org.

BEDLINER, over-the-rail style, for 2001 Dodge Ram Quad-Cab pickup with 6'8" bed, factory Mopar liner with Ram logo, vg cond., \$110. 332-0481.

'81 BEEHCRAFT B-55 Baron airplane, 1540 TNT, 150 en. & props. on Colemill conversion, NDH, King silver crown avionics, KFC 200 auto pilot, new paint/interior, immaculate, considered best B-55 in the world today, make offer. 626/289-8799.

'98 BMW 323is black, automatic, leather, 2 dr., clean, power sunroof, 83K mi., alarm w/keyless entry, am/fm/cass., new brake pads, rear rotors and rear tires, \$12,500/obo. 310/614.5076.

'91 BMW 525i, 4 dr., gd. cond., automatic, burgundy, 172K mi., power moonroof, alarm w/keyless entry, am/fm/cassette, 6-disk CD

changer, \$6,300/obo. 626/705-1312 or sorozco@cefcu.org.

CANOE, Old Towne, Katahdyn, 16', burgundy, retail \$849, sell \$500. 957-7742.

'99 CHRYSLER LHS, white, exc.cond.,V6, CD player/tape deck (Infinity), chrome wheels, leather interior, full power windows/seats, heated seats, a/c front & back, cruise control, new transmission and a/c, roomy, quiet/smooth ride, only 37K mi., \$9,999. 909/225-2323.

CORONADO sailboat, 23 ft., w/Nissan 5 hp, exc. cond., radio, sails, other equipment included, ready to sail to Catalina, perfect for new sailors, must see, \$2,300/obo. 626/584-1164, Muriel.

COVER for Acura MDX, brand new in box, never used, made by Intro-Tech of silver woven polyester, cost \$160 new, sell \$120. 249-8186.

'00 FORD Taurus LX sedan, V6, 3.0L, Flex Fuel, 4-dr., a/c, automatic, power steering/ windows/door locks, tilt wheel, cruise control, am/fm stereo cassette, dual front airbags, 87K freeway mi., metallic blue exterior, gray interior, all new brakes, current registration with new smog certificate, \$4,825. 626/798-1765.

'99 FORD Windstar, 7-pass., V6, low miles, 32K, 2nd sliding door, keyless entry/security system, am/fm, cass., 10-disc CD-changer, privacy glass, power window/door, air, etc., vg cond., clean, well-maint., pics. avail., \$7,200. 653-8571, Jack.

'98 FORD Windstar GL, 3.0L, 95K mi., red, automatic transmission, airbag, a/c, radio + tapes, gd. cond., \$6,500. 952-5587, benoitte.kneib@free.fr.

GREASE/GEAR PUMP and container for auto lube jobs, 5 gal., includes 6-ft. high pressure hose and grease coupler, \$45. 249-6071.

'81 GULFSTAR 44 sailboat, center cockpit sloop, radar, loran, GPS, auto pilot, propane, stereo, 3 staterooms, 3 showers, new canvas, always privately owned, many upgrades, near Bristol cond., make offer. 626/289-8799.

'99 HARLEY DAVIDSON Soft Tail, completely custom, special construction, 80" motor, Kurykan hypercharger, lowered, wide rear tire, full fenders, blue w/tribal design, everything chrome or polished, priced to sell, \$19,500. 974-8136, Tony.

HITCH, Equal-i-zer sway control, complete system, the best sway control hitch available, exc. cond., \$160. 626/359-7666.

'88 HONDA Accord LX, 4 dr., 5 speed, a/c, cruise control, p/w, p/l, 193K mi., great for student, well maintained, \$2,200/obo. 626/332-5753, Chad.

'02 HYUNDAI Santa Fe sport utility, gold color, exc. cond., 2.4L, 4 cyl., 2WD, auto, 16K mi., a/c, am/fm stereo, single CD, power steering/windows/door locks, remote entry, cruise control, tilt wheel, roof rack, privacy glass, alloy wheels, \$14,000. 562/699-6061.

'99 LAND ROVER Range Rover, 4.0 sport utility, 4-dr., exc. cond., \$17,900. 626/379-3503, Erik.

'98 MERCEDES E430, silver & black, low miles, exc. cond., \$18,900. 626/379-3503, Erik.

'89 MERCEDES BENZ 260E, 4-door, gold, 147K orig. miles; garage kept, interior perfect, looks and runs great; new tires, brakes; \$4,500. 626/794-6860.

'97 PLYMOUTH Grand Voyager SE minivan, V6 3.3L automatic, gold, 92,000 mi.: front wheel drive, 2nd sliding door, 7 psngr., a/c, rear air, pwr. steering/windows/doorlocks, tilt whl., cruise control, am/fm stereo/cass., 6-cd player, dual front airbags, 4-whl. ABS, roof rack, privacy glass, 2 folding built-in child safety seats, rear window defroster/wiper, alloy wheels, gently used, \$7,000. 626/797-9846 or dedicatedmama@hotmail.com.

'92 PLYMOUTH Sundance, 91.5K mi., beige, automatic transmission, airbag, a/c, radio, 4 dr., new tires, good runner, \$1,400. 952-5587, benoitte.kneib@free.fr.

SEAT BENCHES for Ford Aerostar van, 2, blue, make offer. 248-0853.

'97 TOYOTA Avalon XLS, loaded, 3-CD changer, moonroof, power leather seats, wood trim paneling, pearl white color, auto, salvage history, 72K mi., exc. cond., \$8,000. 909/599-3230.

'92 TOYOTA Previa van, loaded, gd. cond., 104K mi., 1 owner, runs well, \$3,600. 952-5336.

'99 VOLVO V70 GLT-R, white, tan leather heated seats, am/fm/CD/cas. audio, moonroof, rear spoiler, roof rack, 3rd row seat, front & side airbags, full tinted glass, dual climate syst., 17" white R-wheels, hot/cold box, new tires, recent fluids change, very clean cond., 90K mi., \$10,900/obo. 653-9604, Steve.

Free

CAT, older female Siamese, left behind when family moved, 990-3586.

DINNER PLATES, Tv/patio, 20 metal trays + 60 packaged, divided paper liners. 909/593-4046, vividavies@earthlink.net.

SUNROOF PANEL with cover, for '79 Mazda RX-7, like new, removable. 626/355-7086.

Wanted

CARPOOLERS from Diamond Bar and Chino Hills, leaves Diamond Bar at 7 am. 4-9329, Shu.

BACKPACKING buddy for 1 week, Kings Cyn./Sierras trip, prefer week of July 12, strenuous hike, wish to avg. 9-12 miles a day, substantial altitude gain/loss, experienced backpacker preferred. 626/798-4265, Louise.

HOUSE or duplex to rent, need 2 or 3 bedrooms, 2 baths, must have washer/dryer hook-ups, currently living on property that has been sold, need something quick, \$1,300 max. 548-5082, Carla.

HOUSE to lease or rent, 3 bd. in Temple City. 626/574-1495, Suzi.

NANNY to care for 11-mo.-old girl and 10-mo.-old boy, loving and experienced person to provide 3 days of child care per week in our home in the NE Pasadena area, must be non-smoker and have reliable transportation. 626/811-8723, Farrah or 626/296-3185, Diana (Español).

SPACE INFORMATION/memorabilia from U.S. & other countries, past & present, for personal use. 790-8523, Marc Rayman.

SUBLET for 1 person; apt., house, guesthouse,

cottage, townhouse or condo; short term, Aug. 1- Oct. 31; unfurnished, hardwood floors preferred, no pets; within 10 mi. of JPL, near public transportation. 626/437-9593 or jolani-tash@yahoo.com.

VOLLEYBALL PLAYERS, coed, no beginners please, Tues. nights 8 to 10 p.m. at Eagle Rock High School, \$4/nt. 956-1744, Barbara.

For Rent

ALTADENA "sabbatical house," 3 bd. + study, boundary Angeles Nat'l Forest, 3 mi. from JPL (trails to Lab behind house), view, hardwood floors, fireplace, antiques, completely furn.: dinnerware, utensils, pots/pans, linens, fine soaps, necessities included, just bring toothbrush & clothes, TV/DVD/VHS, Dish satellite, wireless DSL, garden, fruit trees, courtyard, BBQ, parking, private, immaculate, mo.-month, avail. Aug. 626/429-3405.

LA CANADA, 1 bd., 1 ba., in 4-plex, upstairs unit w/stove, safe, quiet area, \$1,000 + security. 626/798-4134.

LONG BEACH, Belmont Shore--area house for lease, short walk to water, 2 bd., 1 ba., \$1,800. 626/794-3250.

PASADENA, beautiful home in Hastings Ranch, 3 bd., den, 2 ba., central a/c, 2 fireplaces, refrigerator, stove, microwave, washer/dryer, large yard w/pool & spa, on golf course, lease required, avail. Aug. 1, \$3,300 + utilities & \$4,300 security deposit. 626/429-3677 or bettyrs@earthlink.net.

PASADENA house to share in historic Bungalow Heaven, 3 mi. to JPL, 2 bd., 1 ba., beautiful and eclectic craftsman home with yard/butterfly garden, great neighborhood, friendly neighbors, share with 30ish female JPL'r & dog, bedroom can be furnished or unfurnished, as required, short-term OK, \$550 util. incl. 626/798-4265 or lahamlin@ginkgoleaf.net.

PASADENA, 3-bd. townhouse, gated, exec. complex in quiet neighborhood, close to Huntington House, Old Town & rail, fire-place, pool, spa, covered patio, spacious, lots of closet space, laundry, all appliances, cathedral ceiling in master bd., \$2,300. 626/429-2284.

PASADENA, 3 mi. to JPL, 2 bd., 2 1/2 ba., 1 rm. as an office/den, fireplace, backyard deck w/spa, laundry closet w/hookups, dishwasher, stove, central a/c, master bd. w/walk-in closet, master ba. w/spa tub & separate shower, \$1,800 + utilities + sec. deposit, avail. Aug.1. 626/390-2474, Ann.

PASADENA, easy-going, non-smoking housemate wanted; small bedroom in 4-bd. house, walking distance from JPL (2 blocks), central air/heat, fireplace, patio and backyard, laundry and kitchen privileges, no pets, off-street parking, \$600 + \$300 deposit, utilities incl. 626/791-1768, Myr.

SUNLAND apt., 1 bd., 1 ba., large, clean, nice, 6-unit bldg., quiet, air, parking, laundry, hardwood cabinets w/built-ins, walk-in closet, new carpet, possible manager position, \$815. 248-7610.

Vacation Rentals

ARROWHEAD cabin, lake view, 6 max., \$140/wkends., \$350/wk., others available, security/cleaning deposit required. 952-6221, Mon-Thur.: 909/337-1036, Fri-Sun.

BALBOA ISLAND, cute 2 bd., 1 ba., apt., weekly rental July-Sept., fully furnished, sleeps 5, covered deck, laundry, steps to bay and canal, \$1,200-\$1,500/week. 626/429-3677 or bettyrs@earthlink.net.

BIG BEAR LAKEFRONT luxury townhome, 2 decks, tennis, indoor pool/spa, beautiful master bd. suite, slps. 6. 949/786-6548.

CAMBRIA house, ocean front, exceptional white water view, accom. up to 4 people, all amenities provided. 702/256-1359, ereynolds2@cox.net.

FLORIDA condo in New Smyrna Beach, fully furn., 2 bd., 2 ba., full kitchen, 1/2 hr. to Cape Canaveral, quiet, relaxing, overlooking beach, BBQ, pool, game room, great ocean view, easy walk to stores and restaurants, sleeps 6, avail. weekly or monthly. 760/439-7821, Darlene or dfhaug@yahoo.com.

HAWAII, Maui condo, NW coast, ocean front view, 25 ft. fr. surf, 1 bd. w/loft, compl. furn., phone, color TV, VCR, microwave, d/v, pool, priv. lanai, slps. 4, laundry fac., low season rate \$115/nite/2, high season rate \$130/ nite/2, \$15/nite/add'l person. 949/348-8047 or jackandrandy@cox.net.

LAS VEGAS timeshare, 5-star resort, 7 nights, 1 bd., sleeps 4, must be 21 to register, Oct. 8-15. 626/447-4734.

MAMMOTH, Snowcreek, 2 bd., 2 ba., + loft, slps. 6-8, fully equip'd kitchen incl. microwave, D/W, cable TV, VCR, phone, balcony w/view to mtns., Jacz., sauna, streams, fishponds, close to Mammoth Creek, JPL disc't. 626/798-9222 or 626/794-0455 or valeriee@caltech.edu.

OCEANSIDE beachfront condo, lovely, 2 bd., 2 ba., deluxe, single level, fireplace, white water ocean views (end unit), luxurious gated complex on the sand, game rooms, fitness room, pools, BBQs, Jacuzzi, 10 min. walk to pier or harbor, slps. 6, JPL discount, www.beachvisitors.com, 760/433-4459, owner.

OCEANSIDE condo, on the sand, charming, 1 bd., panoramic view, walk to pier or harbor, pool/spa, game room, slps. 4. 949/786-6548.

RESORTS, 5-star, includes Carmel, Tahoe, Sedona, Colorado Rockies, Florida and Puerto Rico, luxurious residential-style studios with furnished kitchenette, starting at \$480 for 7 nights, Puerto Vallarta special - studio with full kitchen, \$399 for 7 nights, partial weeks also avail. 626/794-9579 or fivestaresorts@earthlink.net.

ROSARITO BEACH condo, 2 bd., 2 ba., ocean view, pool, tennis, short walk to beach on priv. rd., 18-hole golf course 6 mi. away, priv. secure parking. 626/704-3906.

SAN FRANCISCO, Nob Hill Inn, walking dist. to Union Square, cable cars, Grace cathedral, financial district and Chinatown, non-smoking property, 15 miles from SFO, unit sleeps 4, one week from 7/30 to 8/6/2004 (Linux World Conference week), \$600. tcfcs@aprelix.com.

TIMESHARE, Americas, Asia or Europe, see directory at www.IntervalWorld.com, 2 bd., 2 ba., accommodate up to 6 adults, 4- or 5-star resorts, need 2-mo. advance planning, \$950/wk. 323/257-5703, or Edward1@gmail.com.